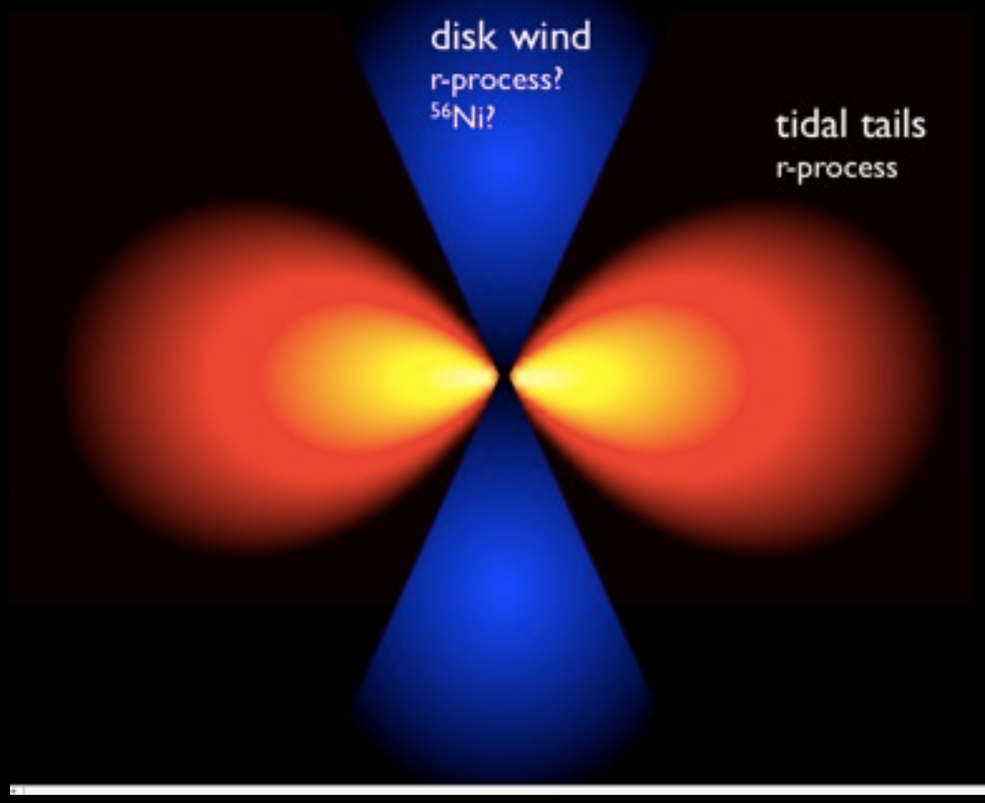
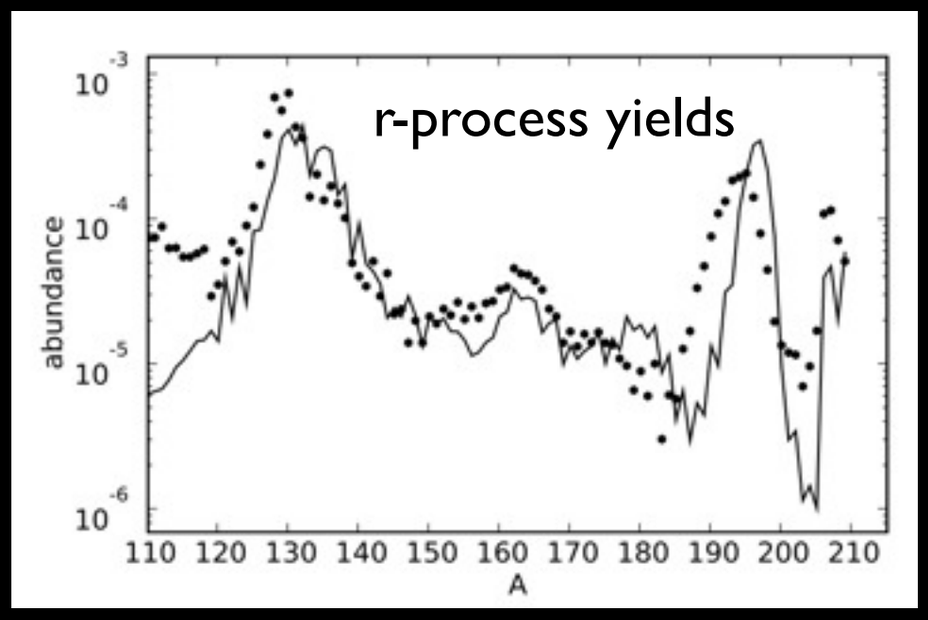


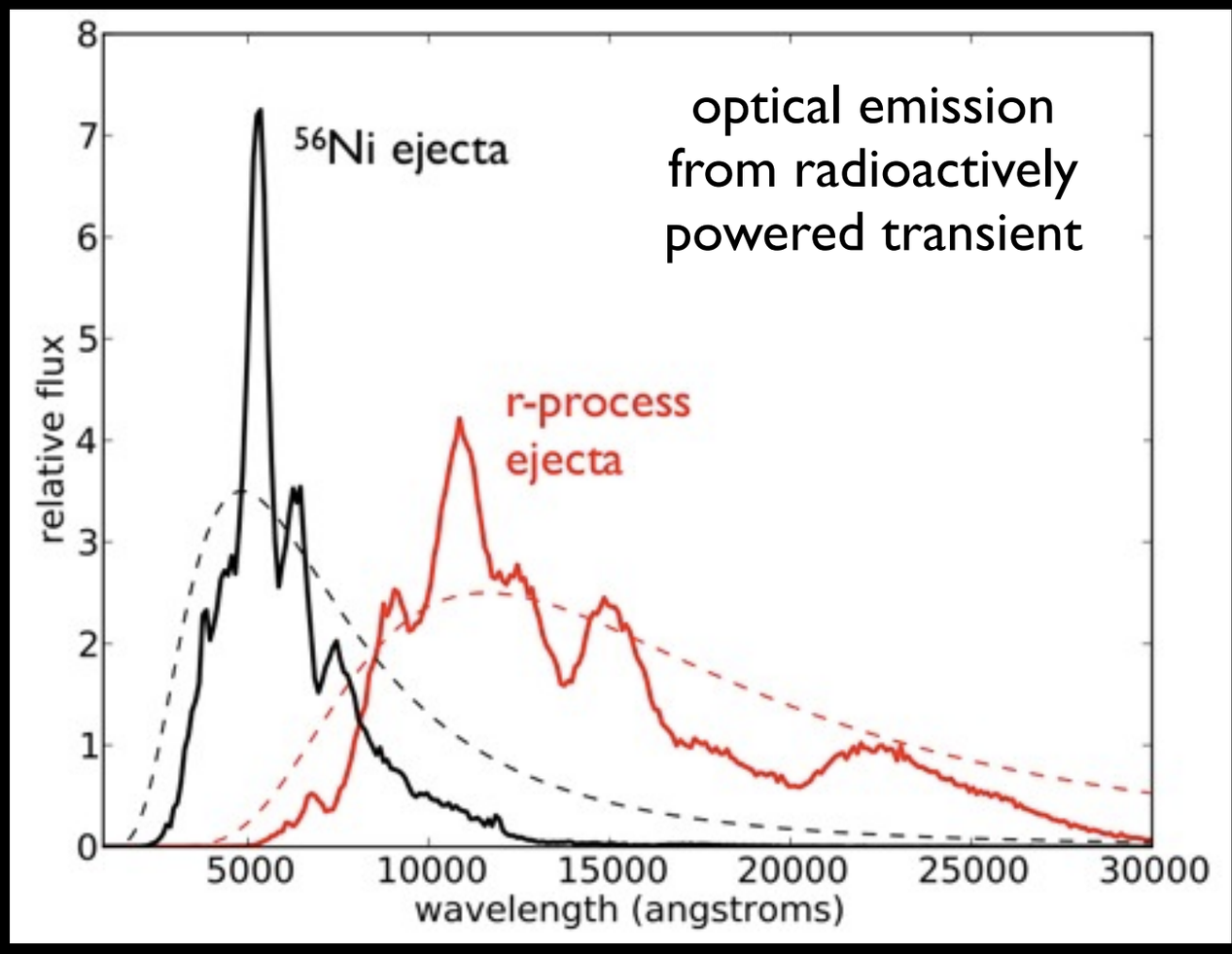
probing r-process nucleosynthesis in neutron star mergers

kasen, badnell and barnes 2013

barnes and kasen 2013

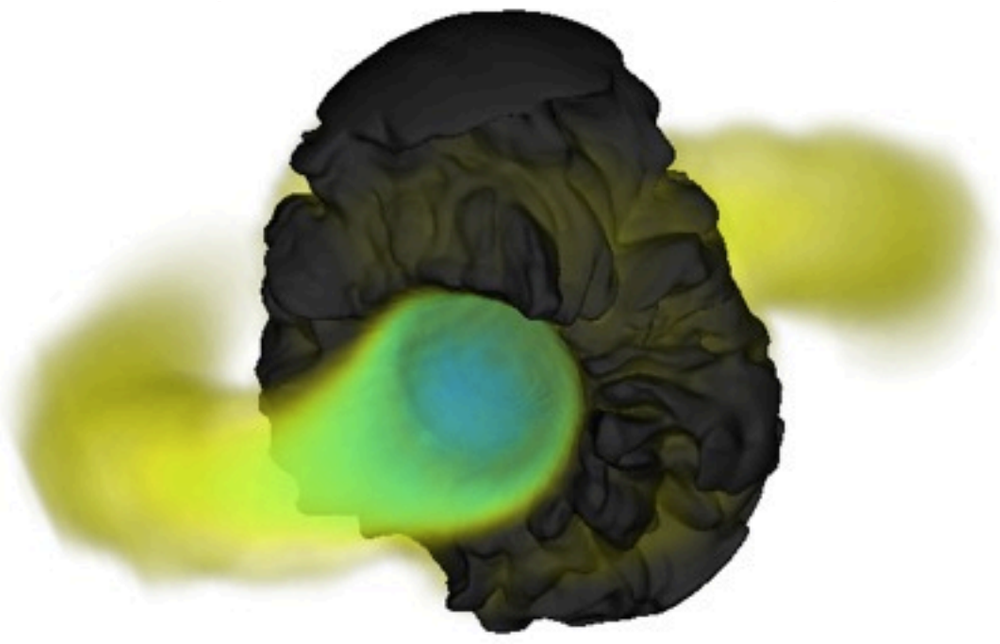
matter ejected in neutron star mergers can produce heavy elements by rapid neutron capture. Subsequent beta decay to stability produces a radioactively powered optical emission which may be detectable



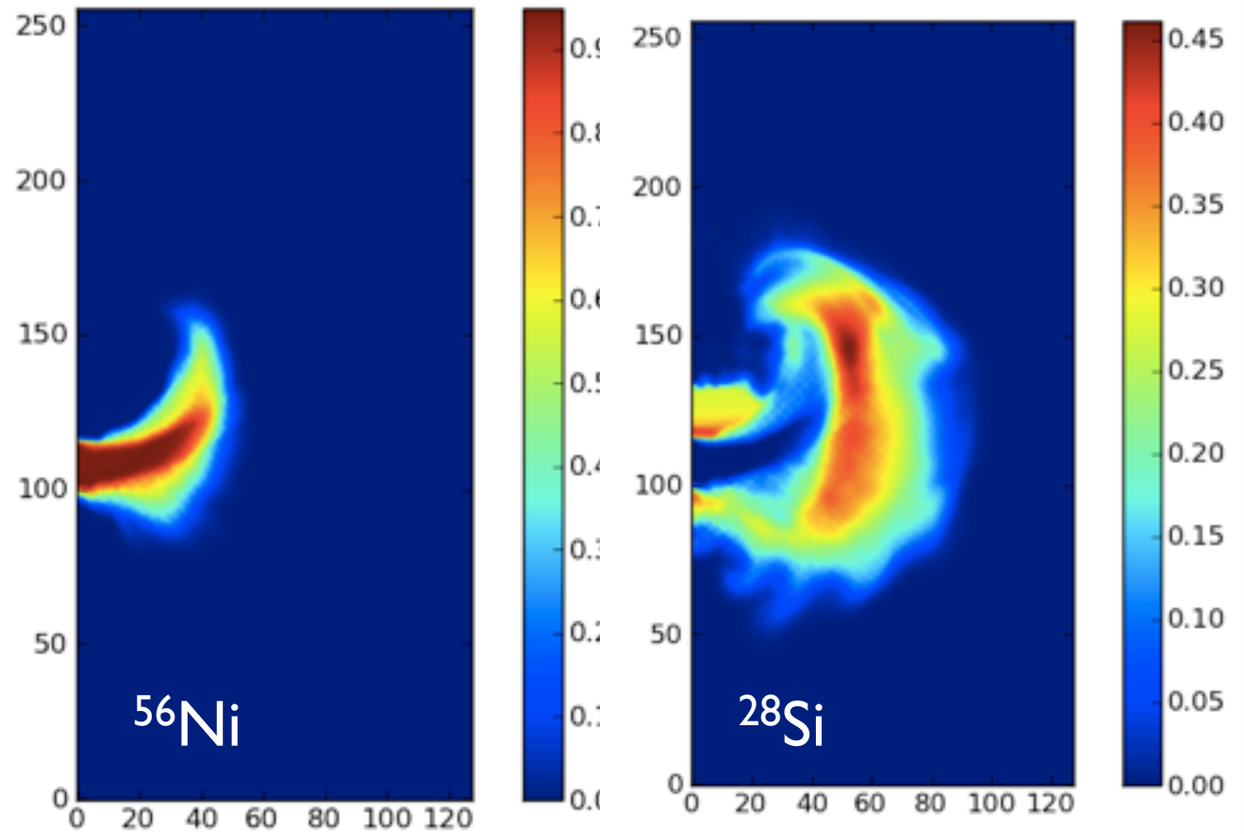


thermonuclear supernova from merging white dwarfs

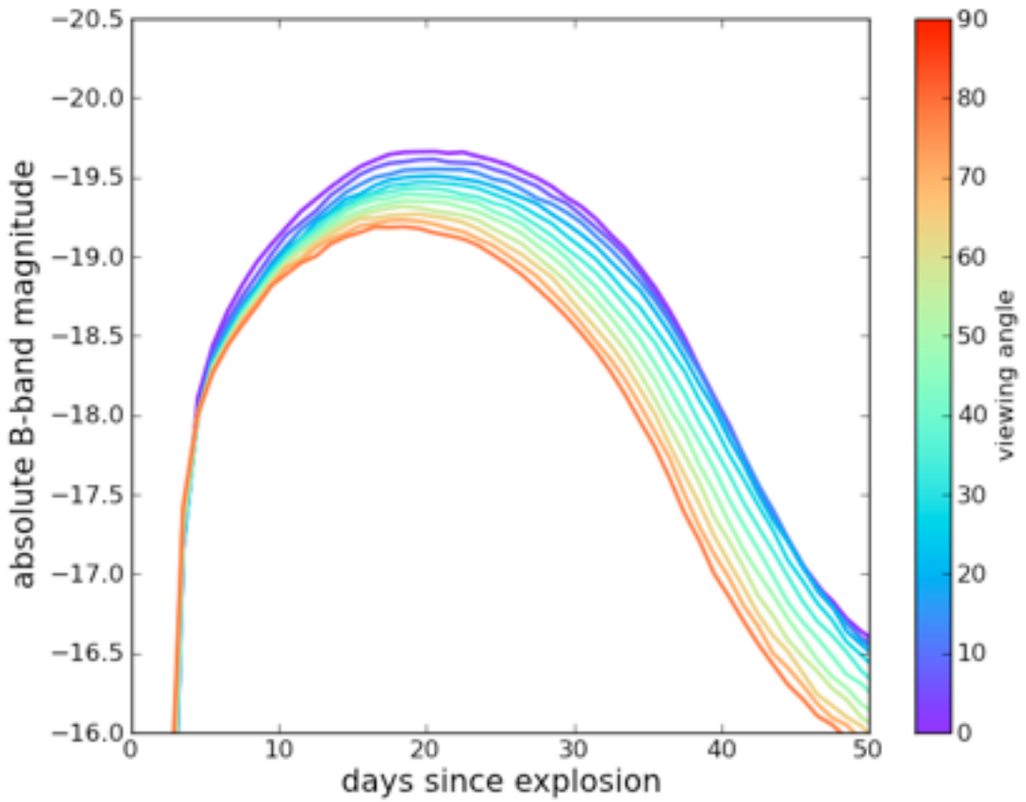
explosion dynamics
(SNSPH + CASTRO codes)



nucleosynthesis calculations (CASTRO)



radioactive powered light curves
(SEDONA code)



comparison of simulations to observations (e.g., SN2011fe) helps clarify the nature of Type Ia supernovae

Bloom, Kasen+ 2012, Shen+ 2012, Raskin & Kasen 2013

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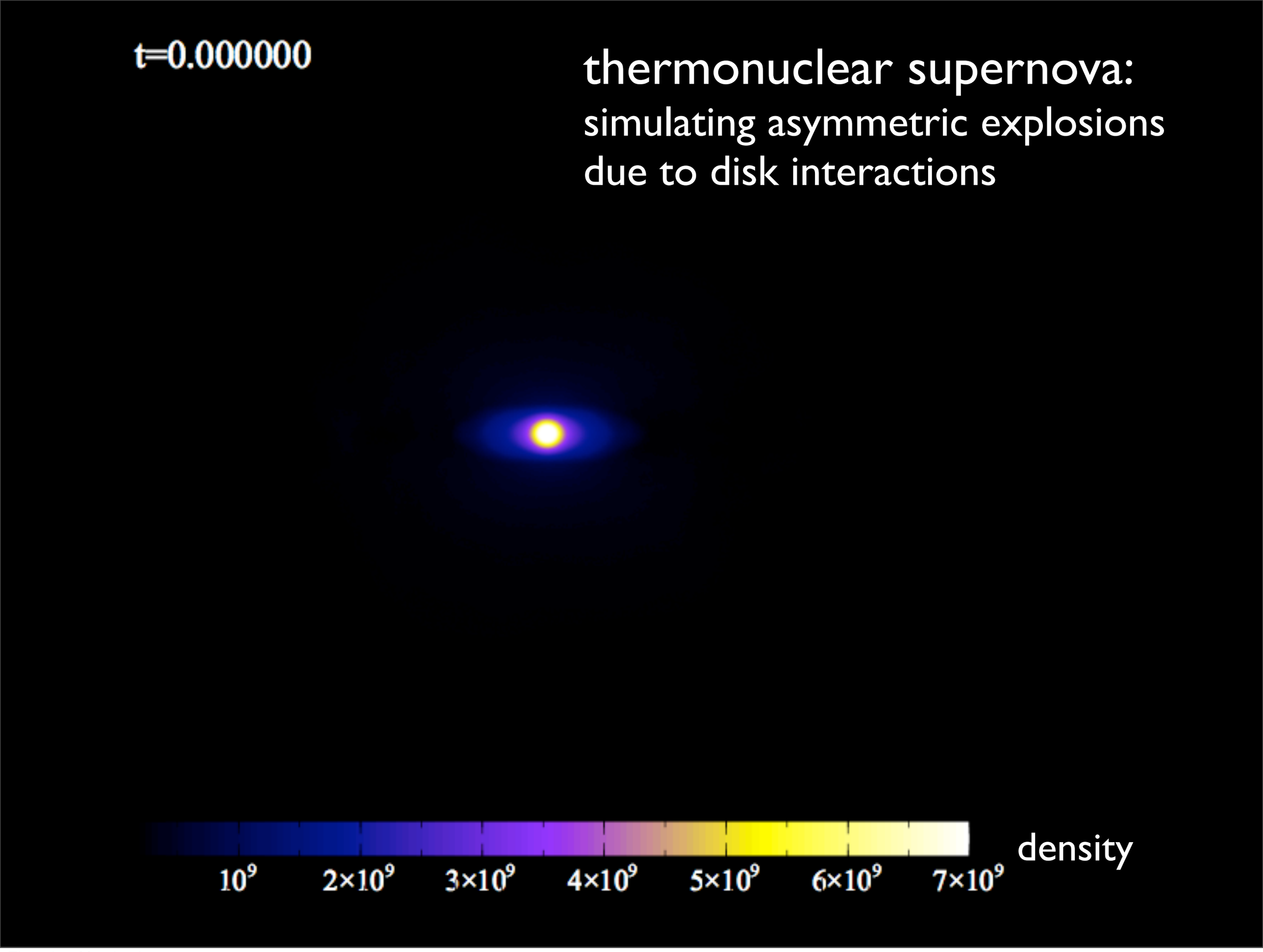
thermonuclear supernova:
simulating asymmetric explosions due to disk interactions



future plans

neutron star mergers and r-process nucleosynthesis

- Model the radioactive decay and thermalization processes occurring in newly synthesized r-process ejecta.
- Run 3-dimensional radiation transport simulations of radioactive powered light curves of r-process outflows.
- Further develop and apply 3-D neutrino transport calculations to study the lepton fraction and nucleosynthesis in disk winds.

thermonuclear supernovae

- Simulate thermonuclear supernovae triggered by helium detonations on the surfaces of white dwarfs
- Study the nucleosynthesis and spectra of peculiar, low energy supernovae
- Run massively parallel, adaptive mesh refinement 3-D radiative transfer calculations to explore clumping and resolution effects.